

COoperative Yearly Operational Technology Evaluation





Distributed Mission Training

Air Force Research Laboratory
Warfighter Training Research Division





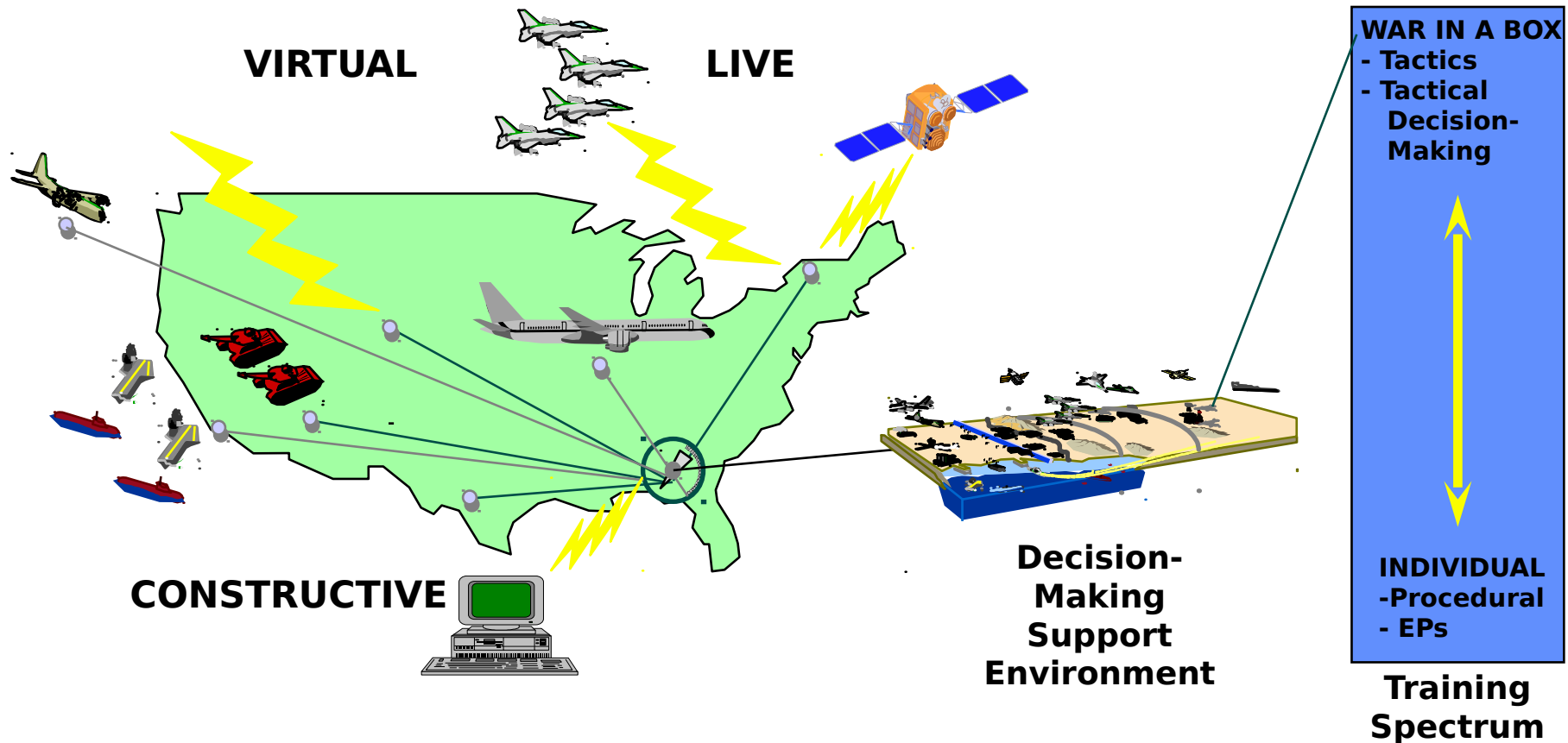
Some Current Training Issues



- **High Operations / Personal Tempo**
- **Aircraft will not be prime training medium**
- **Need realistic, robust training systems to compensate for loss of training resources (aircraft, flying time, etc)**
- **Only difference between training and war is in training you should not be getting shot at**
 - **Train at all levels of war**
- **Training must become affordable and available**
- **Warfighter expected to be perfect in training and in war**
- **Readiness / training cannot be compromised to save money**



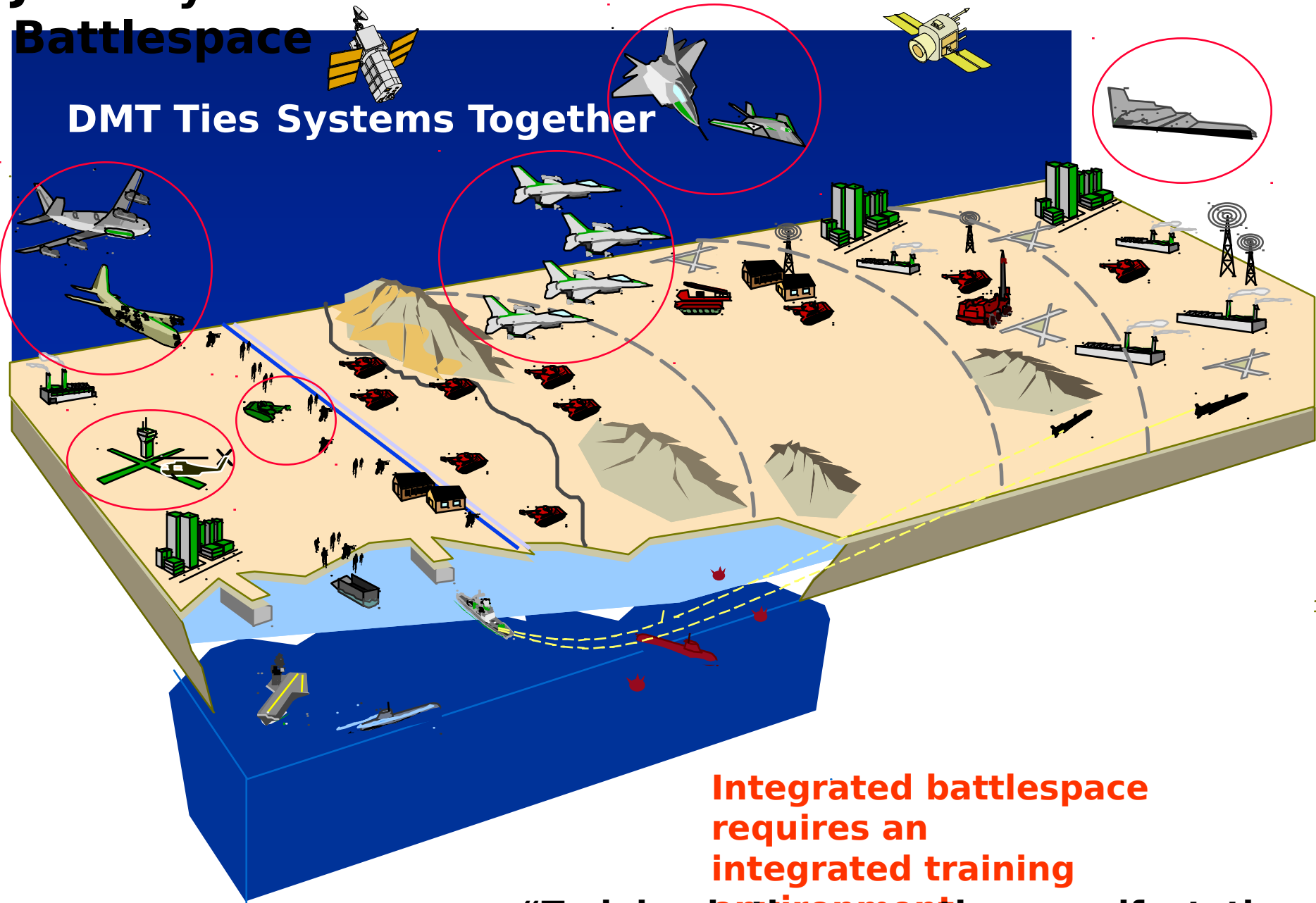
The DMT Concept



A shared training environment comprised of live, virtual, and constructive weapons systems allowing warfighters to affordably and realistically train individually or collectively at all levels of war

Joint Synthetic Battlespace

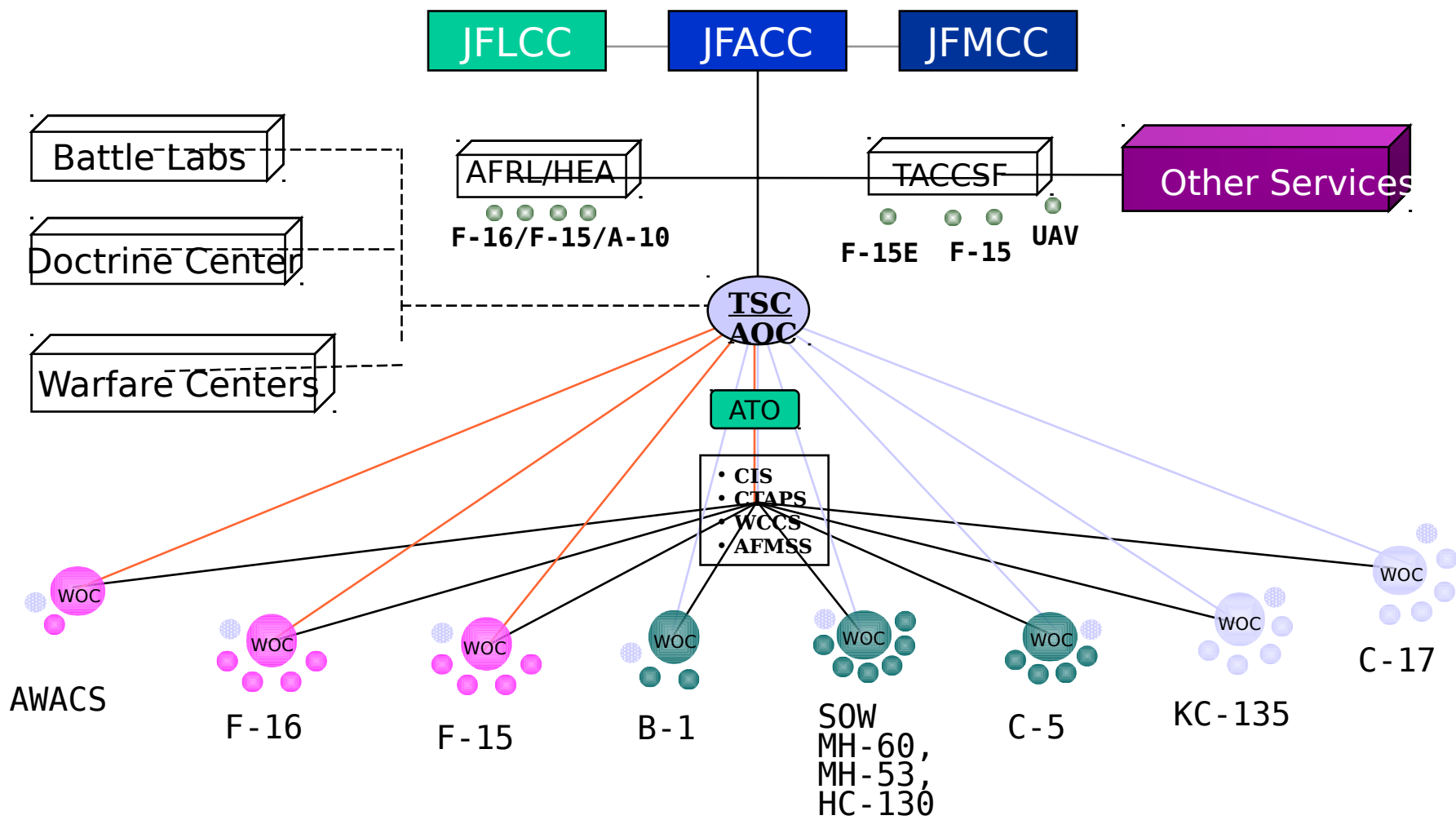
DMT Ties Systems Together



“Training is the peacetime manifestation
of war”



Mission Training System: Cornerstone

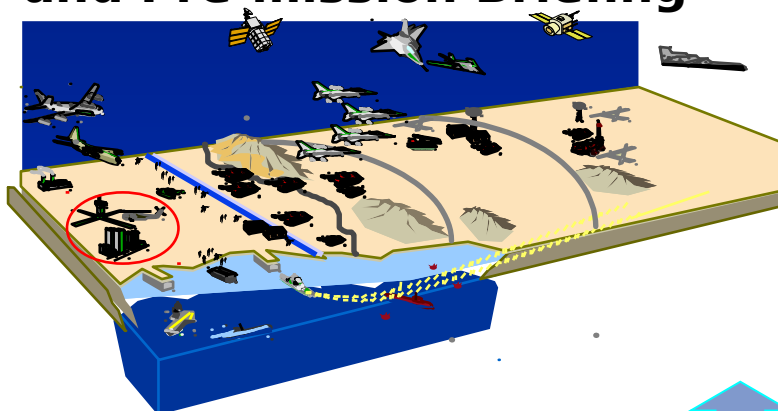




DMT Will Support Full Spectrum Of Mission Training



Mission Planning, Rehearsal and Pre-mission Briefing

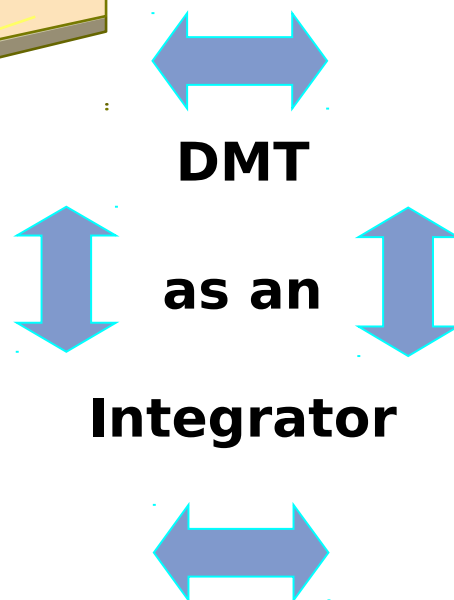


Debrief, Analyses and Replay

Mission Execution and Replanning



Development & Maintenance Proficiency and Mission Skills





Rationale for Program

CSAF directive to pursue DMT Program

“We are also pursuing the development of revolutionary new ways to train our operational aircrews. Distributed mission training will use state-of-the-art distributed simulation technology and advanced flight simulators to permit aircrew to remain at their home units while “flying” and training in synthetic battlespace, hooked electronically to other aircrews located at distant airbases. This will improve the quality and availability of training while reducing aircraft operation and maintenance costs, as well as limiting the amount of time our personnel will have



Rationale for Program



Training Systems Product Group (TSPG) request to support enabling DMT technologies

“Request your support in developing enabling technologies related specifically to Distributed Mission Training (DMT). We believe these developments correlate well with your Train the Warfighter and Modeling and Simulation laboratory-wide thrusts. Once transitioned, these technologies will allow us to support required training initially at the unit level, but migrating to Air Force wide and ultimately joint training exercises.”

– James A. Cunningham, Product Group Manager,

TSPG



Rationale for Program



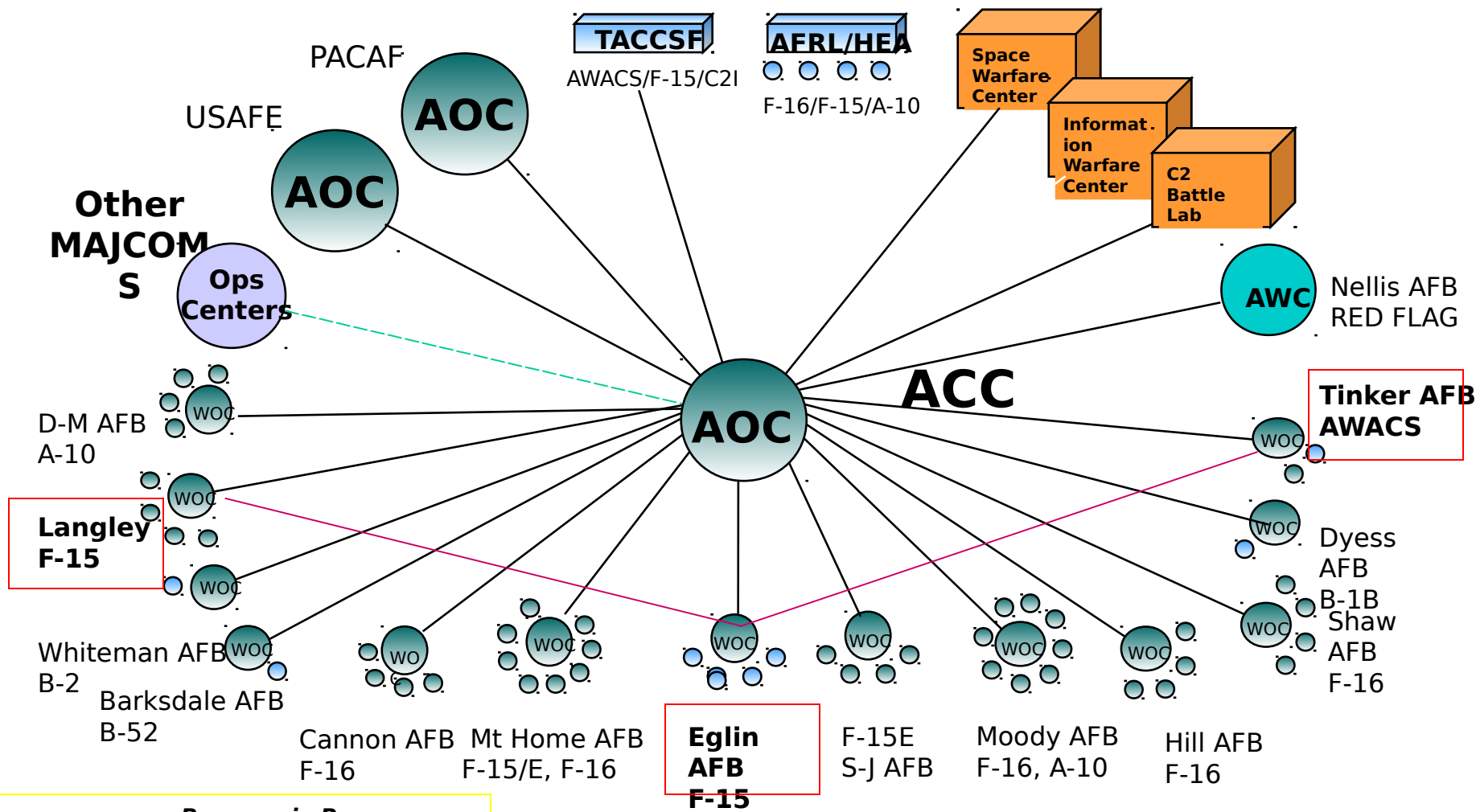
Air Mobility Command (AMC) request to support enabling DMT technologies

“Therefore, we ask for your support in helping fund necessary studies, developing prototype demonstrations, and acquiring the networking technologies to bring AMC into the DMT environment.

Specific areas where we would like to focus include aerial refueling with both AMC and non-AMC aircraft, combining multiple devices for crew and multiship training, operations and integration tasks, wide area networking of legacy systems, development of supporting models and simulations for DMT, and DMT training and validation methods.”

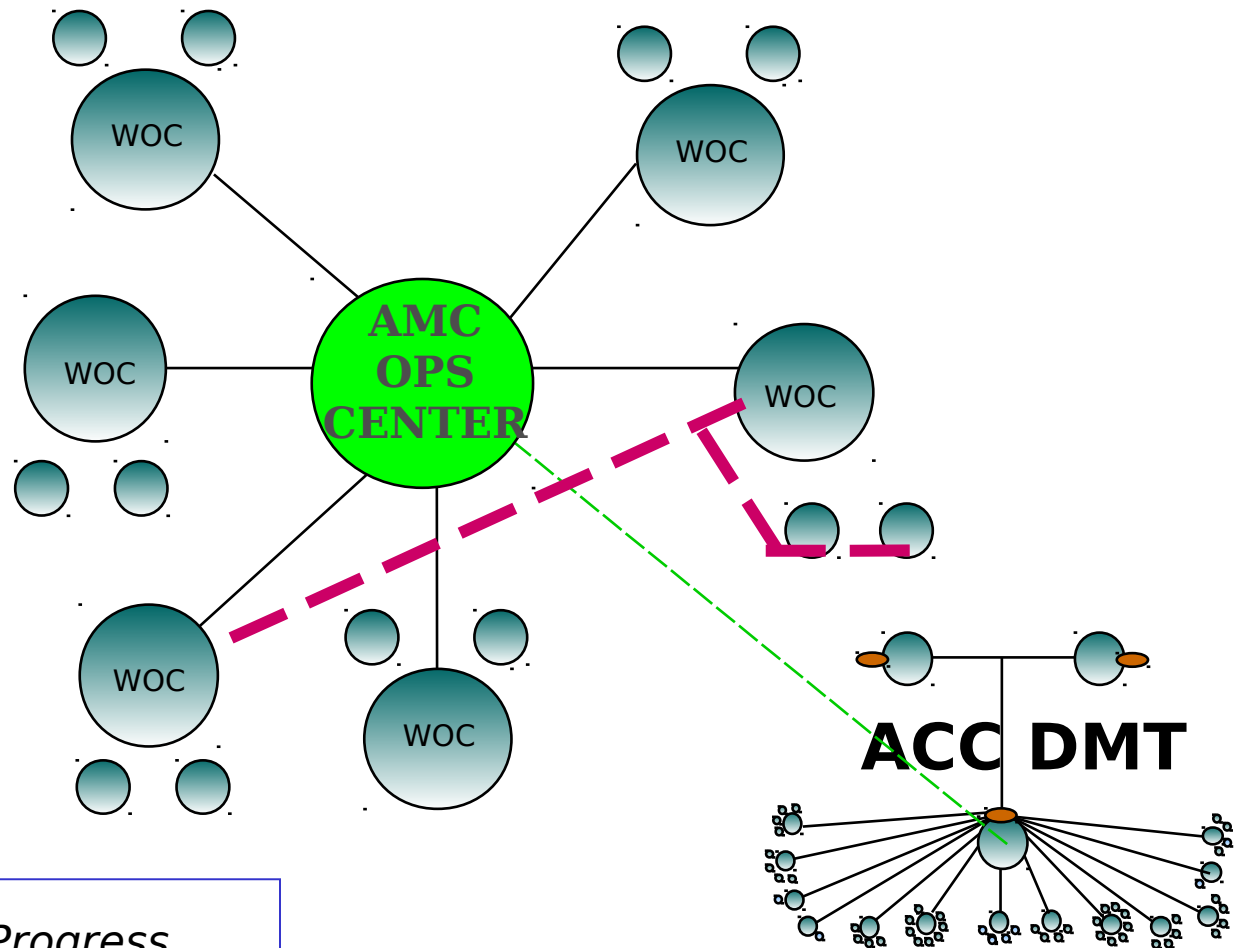


ACC Notional DMT Network





AMC Notional DMT Network

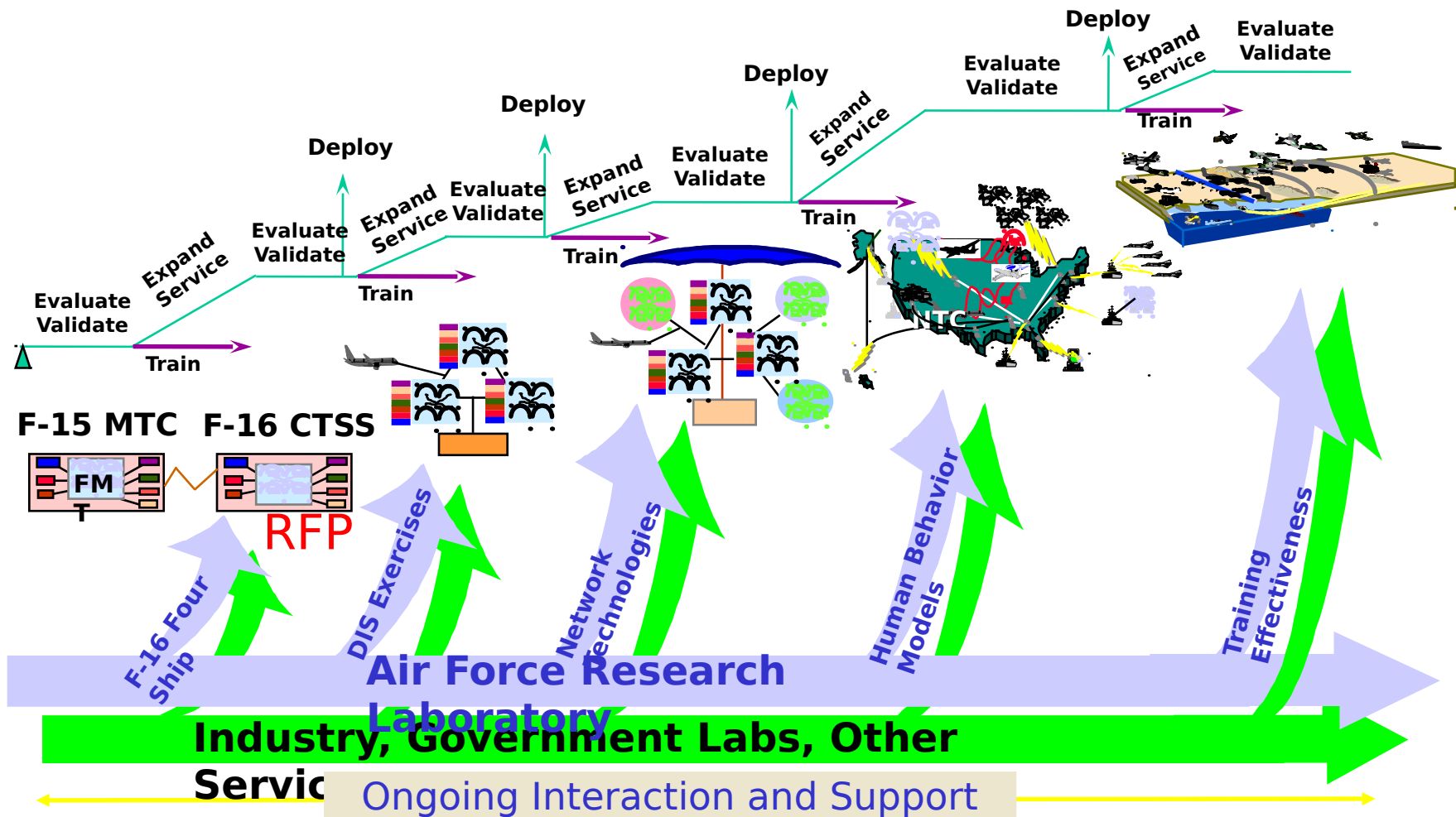


--- Program in Progress

--- Potential Future Connection



Distributed Mission Training





AFRL/HEA's DMT Vision Statement



**“Train the way we intend to
fight”**



AFRL/HEA's DMT Mission Statement



Conduct Research and Development (R&D) that enables Distributed Mission Training (DMT) to become a realistic training environment comprised of live, virtual and constructive entities that allows warfighters to affordably and effectively train individually or collectively at all levels of war through the interconnection of multiple players at multiple sites in a complex, scaleable environment with a tailorable training capability which mirrors the modern battlespace.



AFRL/HEA's DMT Program Goals



- 1. Effective training**
- 2. Fully integrated unit level ground-based training environment**
- 3. Affordable training**
- 4. Validated techniques & technologies**
- 5. Realistic training environment**
- 6. Multi-national connectivity**
- 7. Multi-national tech sharing**
- 8. Training capability available at unit level**
- 9. Live, virtual, & constructive interfaces**
- 10. Scaleable environments**
- 11. Tailorable training capability**
- 12. Multiple player and multiple site inter-connectivity**



Distributed Mission Training

Customers / Partners



- **DoD Decision Makers**
- **MAJCOMS: AMC, ACC, AETC, AFSPC, AFSOC**
- **AFRC, ANG**
- **USN, USMC**
- **ASC/YW**
- **Collaboratory Partners**
 - **DARPA**
 - **DMSO**
 - **Industry**
 - **SGI, E&S, Multigen, Smiths Industries, BMH, CACI**
 - **Academia**



Distributed Mission Training

Customers / Partners



- **AFRL Customers**
 - **AFRL/HEA Warfighter Training Research Team**
 - **Simulation and DMT Integrating Thrust Partners:**
 - **Human Effectiveness (AFRL/HE)**
 - **Information (AFRL/IF)**
 - **Space Vehicle (AFRL/VS)**
 - **Air Vehicle (AFRL/VA)**
 - **Sensors (AFRL/SN)**
 - **Munitions (AFRL/MN)**
- **International: Proposed Canadian and NATO Programs**



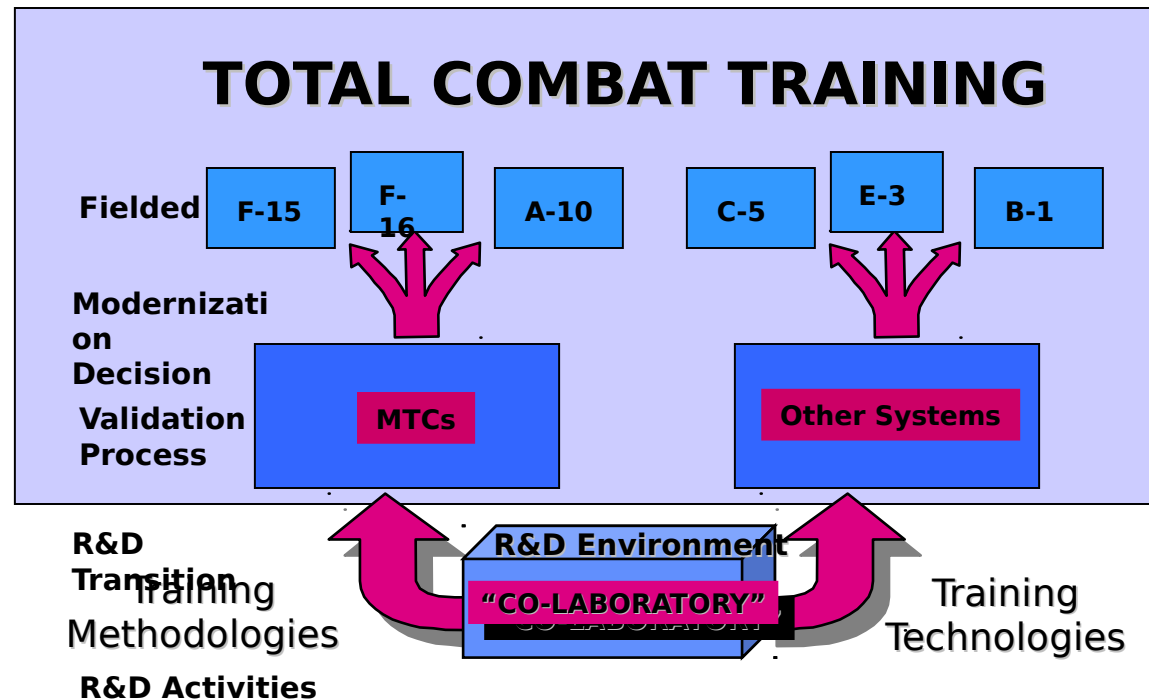
Distributed Mission Training

AFRL/HEA Role



**Major Command
Testbeds**

**AFRL/Mesa DMT
Testbed**

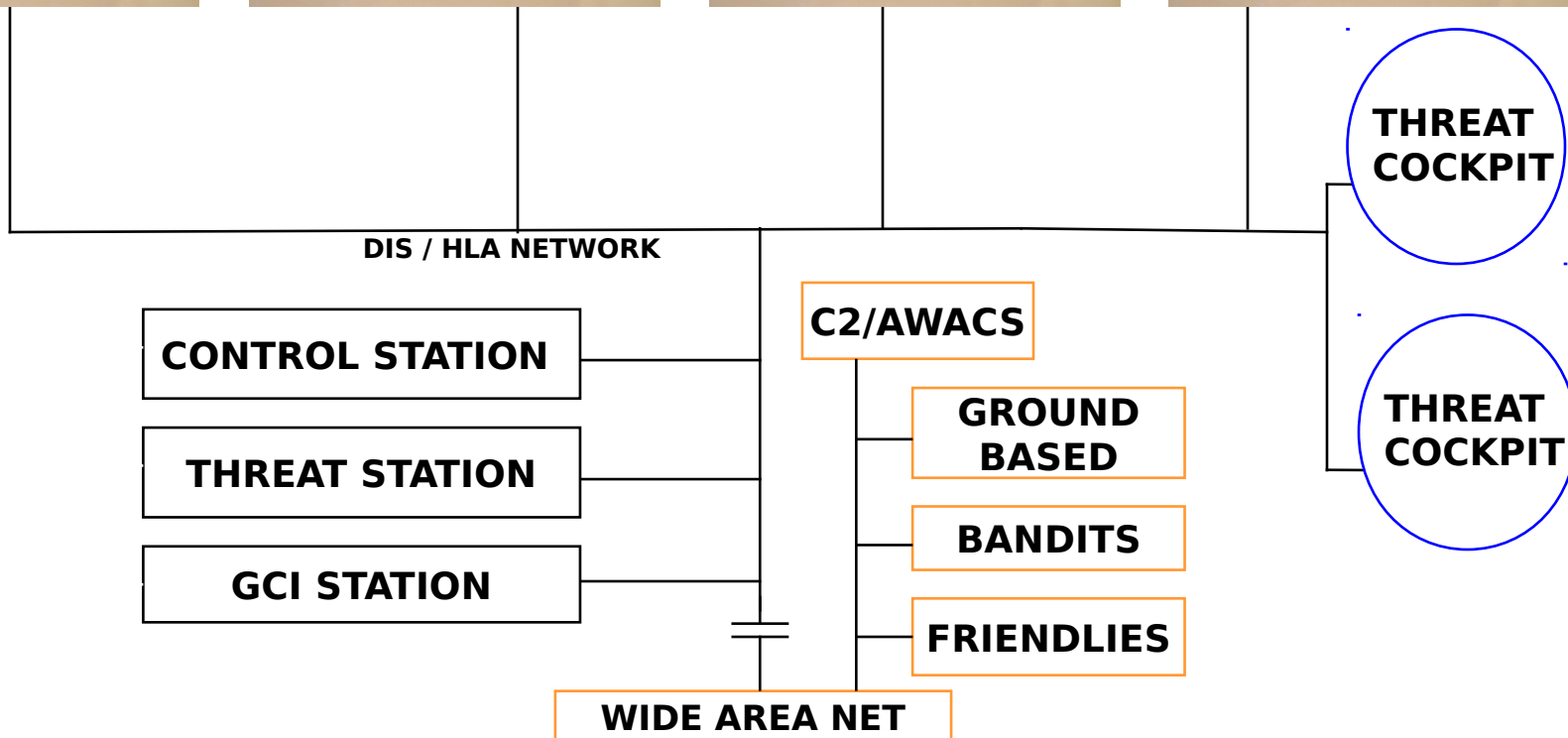


- Air Force Research Lab S&T Engine Feeding DMT/Mission Training Centers (MTC) Programs
- MTC is first step toward DMT for the Major Commands
- AFRL/HEA's DMT Program
 - Provides S&T for DMT technology and methods for all customers



Distributed Mission Training

Testbed





DMT Technical Emphasis Areas



- **Human Systems Technology**
 - Weapons Controller, Control Station, Cueing, Cockpit technologies and testbeds, Physics-based modeling, Wing Command and Control Systems
- **Information Technology**
 - Performance Feedback, Advanced Brief and Debrief, Mission Planning, Real-time Intelligence Data Fusion, Live/Virtual/Constructive and interfaces
- **Interconnection Technology**
 - High Level Architecture (HLA), Distributed Interactive Simulation (DIS) Protocol, Multi-level Security Management (MLM), Bandwidth, Latency



DMT Technical Emphasis Areas



- **Visual Technology**

- Visual Displays, Microlaser Projection Systems, Helmet mounted Displays, 3D Monitors, M2DART, Image Generation, Target Generation Unit, Visual Interface Unit

- **Representation Technology**

- Synthetic Environments, Semi-automated Forces, Synthetic Theater of War (STOW) Technology, Human Computer Interfaces, Databases, Correlated Sensor Imagery, Digital Radar Land Mass Systems, Electronic Combat Environment Development, Threat Cockpits and modeling, Virtual Aggressor Environment



Human Behavioral Research



Needs and Uses the DMT Testbed

- **Higher Order / Team Skills for Mission Success**
 - Training Requirements, Training Shortfalls, and Skill Requirements
 - Develop Training Effectiveness Criteria / Measures
- **Simulation of Friendly / Opponent Operations**
 - Computer Generated Semi- and Fully-Automated Forces
 - Sophisticated Human Behavioral Models
 - Logistics Operations and Constraints
- **Realistic Models of Adaptive Nature of Behavior:**
 - Training Level and Experience
 - Fatigue
 - Cultural Differences
 - Strategic & Tactical Decision-making



Research & Development Feeds and Uses the DMT Testbed



Training Effectiveness / Performance Measurement
Synthetic Theater of War (STOW) High Level Architecture
Data Capture / Reduction
High Bandwidth Networks
Mission Planning
Advanced Control Station
Briefing / Debriefing
Night Vision Device R&D
Multispectral Databases
Advanced Visual Systems
Threat / Electronic Combat Systems
Multilevel Security
The Goal: Create Effective Training Environment

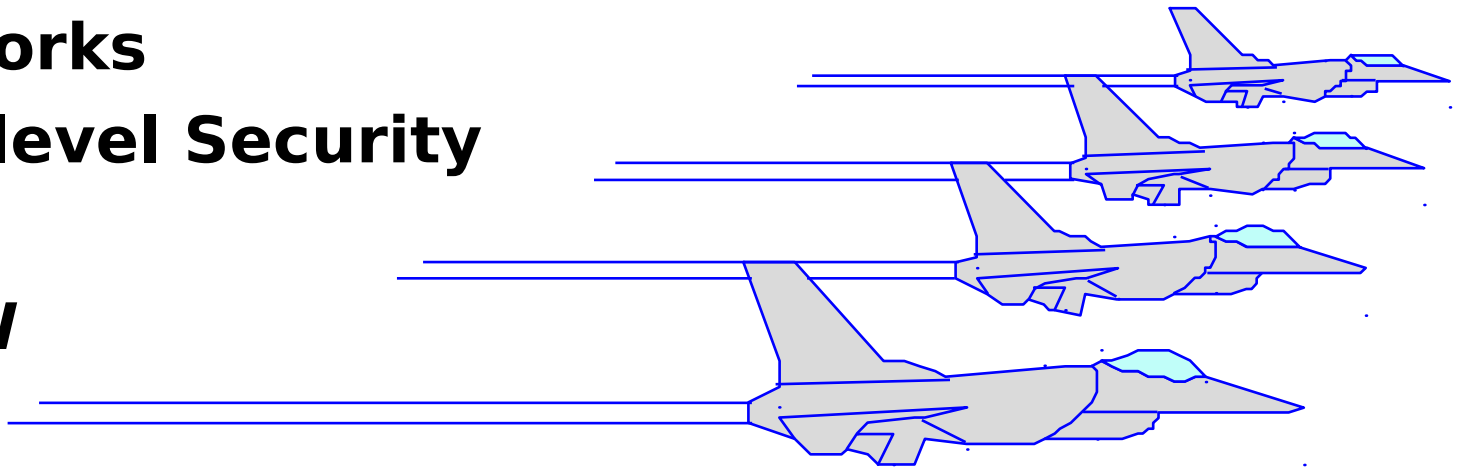




Distributed Mission Training Technology Challenges



- **Advanced Cockpits**
- **Advanced Visual Systems**
- **Databases**
- **Threat / Electronic Combat Systems**
- **Control Station**
- **Networks**
- **Multilevel Security**
- **HLA**
- **STOW**



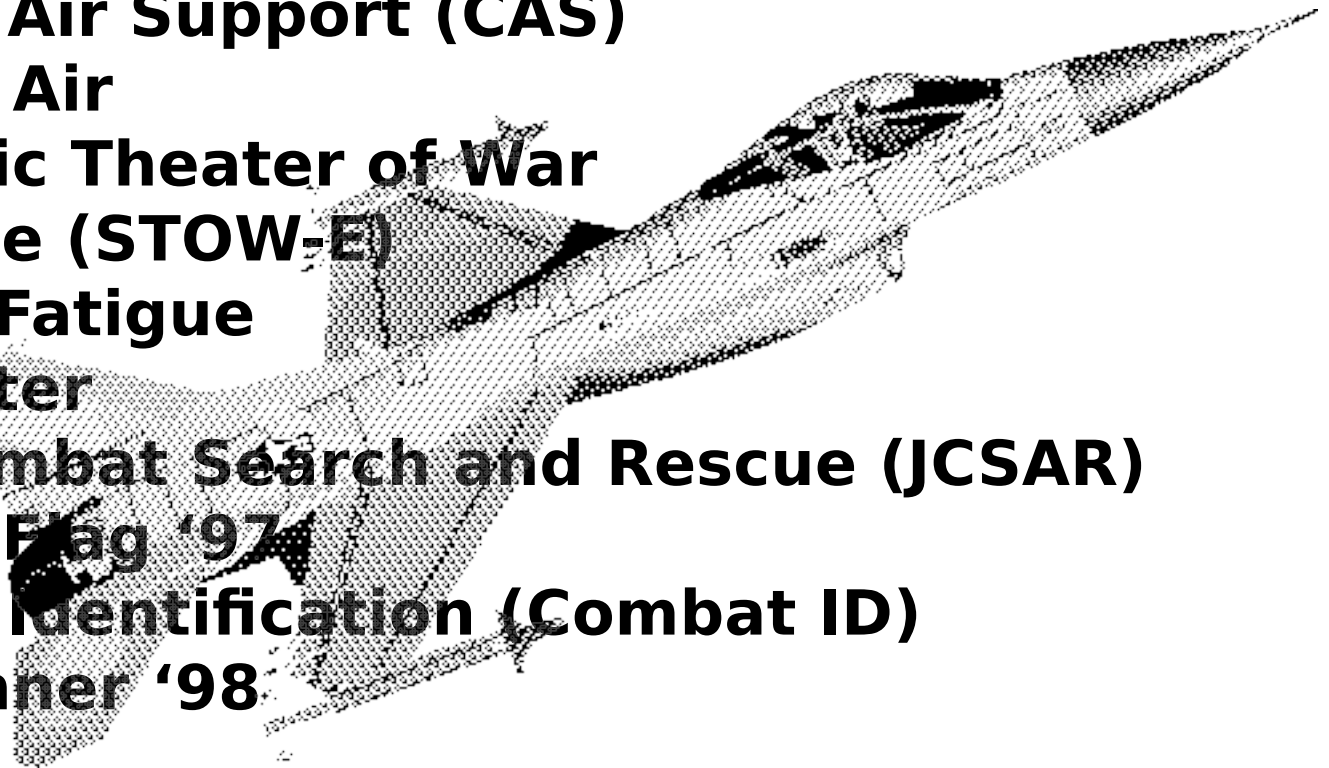


DMT Environment

Long Haul Experience



- **Multi-Distributed Training Testbed (MDT2)**
 - **Close Air Support (CAS)**
 - **Air to Air**
- **Synthetic Theater of War**
 - **Europe (STOW-E)**
- **Fighter Fatigue**
- **Warfighter**
- **Joint Combat Search and Rescue (JCSAR)**
- **Warrior Flag '97**
- **Combat Identification (Combat ID)**
- **Roadrunner '98**
- **EFX '98**





DMT Program Payoffs



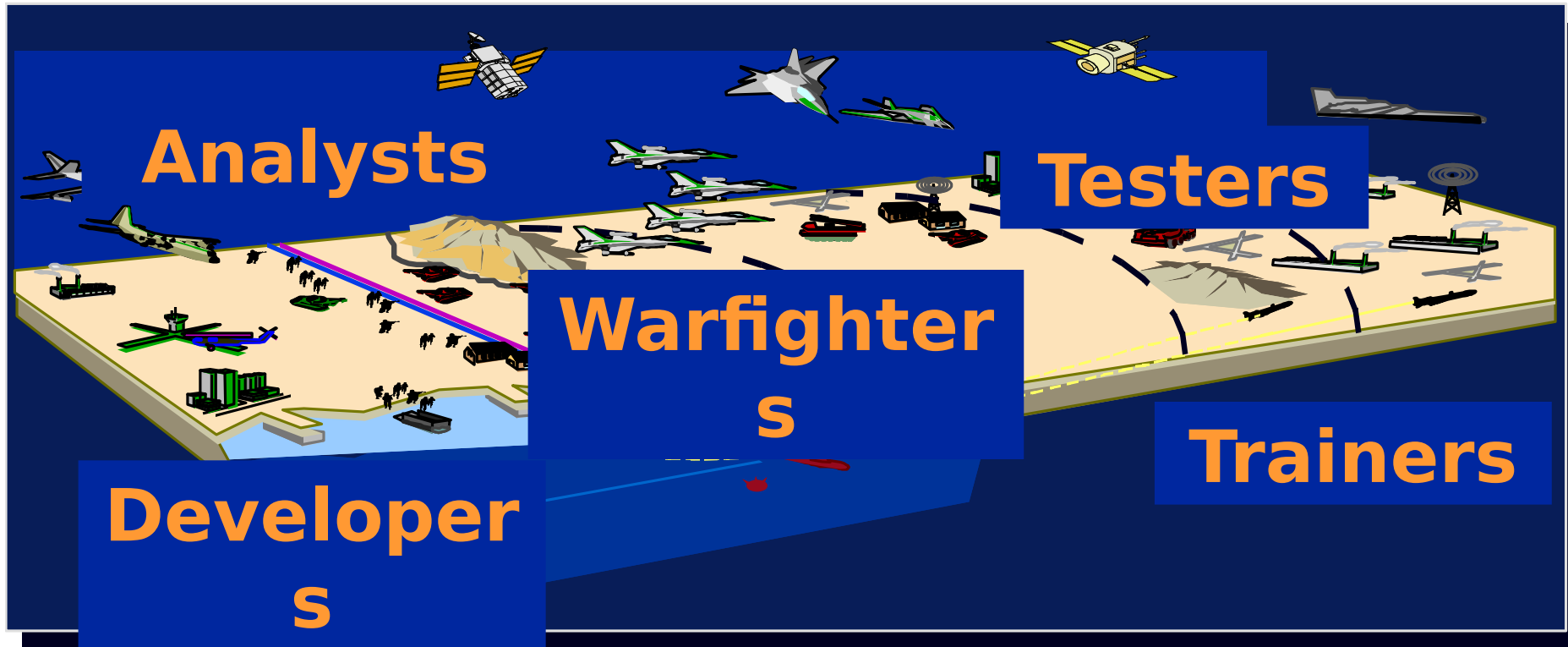
- **Improved readiness**
- **Improved mission skills**
- **Increased individual performance**
- **Increased team performance**
- **Increase state-of-the-art for training products**
- **Improved training environments**
- **Training research testbed**
- **Affordability**
- **Availability**
- **Interoperability**



Why do DMT?



Better Decisions - Better Skills



Collaboratory Decision Support System Using Synthetic Environments



Distributed Mission Training

"Real-time Training - One Byte at a Time" RR'98



David G. ...
Waytheon